Laboratoire international des matériaux antigivre

LIMA AMIL

Anti-icing Materials International Laboratory

SAE G-12 RDF Subcommittee Meeting
Athens, Greece, May 2017
Runway Deicer Performance Working Group (RDP WG)

AIR Performance Test Methods Status of Revision A

Update of RDPWG Works & the Way Forward

Marc Mario Tremblay, AMIL
Document Sponsor AIR6170, AIR6172 & AIR6211

Caroline Laforte, AMIL
Martin Westermaier, MW Aviation Consulting
Kelvin Williamson, LNT Solutions

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UQAC Université du Québec à Chicoutimi

SYSTÈME CERTIFIÉ BNQ ISO 9001:2008 CERTIFIED SYSTEM

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Overview of AIR Performance Test Methods

There are currently three Performance Test Methods for Runway Decing Chemicals Included in AMS1431 and AMS1435

- **AIR6170 - Ice Melting Test Method**
  - ***Originally published in January 2012***
- **AIR6172 - Ice Undercutting Test Method**
  - ***Originally published in February 2012***
- **AIR6211 - Ice Penetration Test Method**
  - ***Originally published in April 2012***
- **AIR Documents**
  - ***were due for an update in 2017 : Revision A***

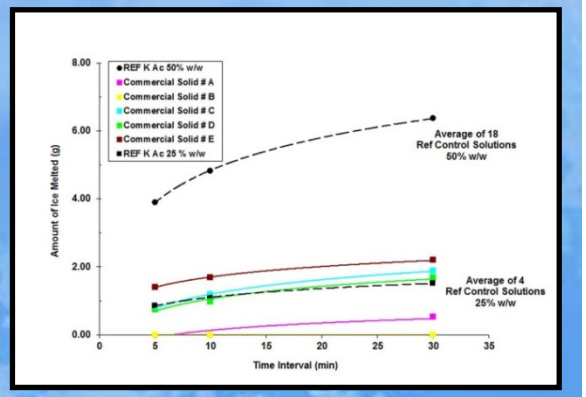
Over the last four years, RDPWG proposed two changes to Revision A of AIR Documents

1st To add KAC 25 %w/w as a reference control solution for solids

- ❑ *Performed many comparative tests*
- ❑ *Many data presented and discussed*
- ❑ *Results consistent and reproducible*
- ❑ *Conclusion confirmed*

RDPWG has recommended this proposed change

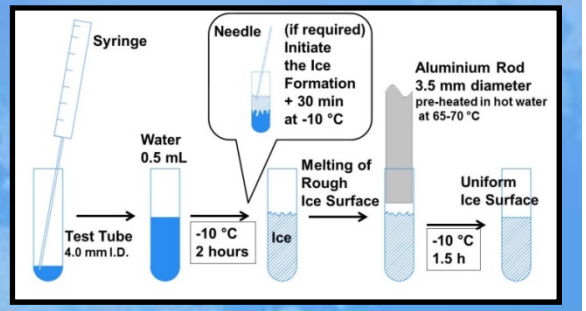
Vancouver Meeting : May 2015



Over the last four years, RDPWG proposed some changes to revision A of AIR Documents (cont.)

2nd Development of a new Ice Penetration test method which allows running tests at -2 °C (current test, -10 °C only)

- ❑ ***Conducted four round robin tests***
- ❑ ***New test support device & ice penetration test protocol***



RDPWG has recommended this proposed change

Savannah Meeting : May 2016

RDP Working Group Actions - 2016

Summer 2016, Working Group recommendations were included in AIR draft documents, Revisions A

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AEROSPACE INFORMATION REPORT

AIR6170™	REV. A
Issued 2012-01 Revised Proposed Draft 2016-08-25 Superseding AIR6170	

Section 3.5
new referen
changes.

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AEROSPACE INFORMATION REPORT

AIR6172™	REV. A
Issued 2012-02 Revised Proposed Draft 2016-08-25 Superseding AIR6172	

Section 3.4.3 c
new reference
changes.

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AEROSPACE INFORMATION REPORT

AIR6211™	REV. A
Issued 2012-04 Revised Proposed Draft 2016-08-25 Superseding AIR6211	

Ice Penetration Test Method for Runways and Taxiways Deicing/Anti-icing Chemicals

RATIONALE

Section 3.4.3 of this SAE Aerospace Information Report has been modified by the addition of KAC 25%w/w solution as a new reference control solution for solid runway deicing/anti-icing chemical. The document also brings some editorial changes. The ice penetration test method has been modified in order to add a second test temperature : -2 °C. The test method involves the use of a new test support (3.3.2) and new ice preparation procedure (3.3.4). The new ice penetration test method is described in 3.4.5.

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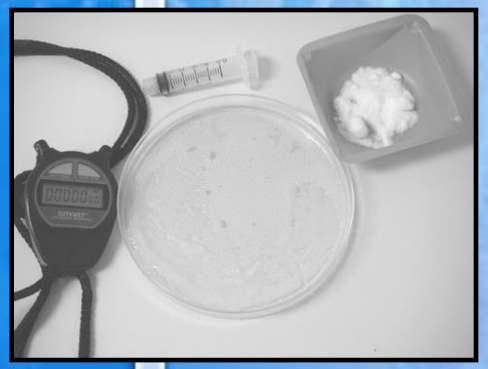
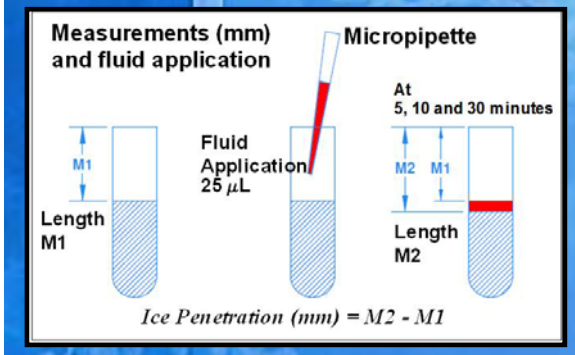
October 2016 the ballots have started



AIR6170A
Ice Melting

AIR6172A
Ice Undercutting



AIR6211A
Ice Penetration

Documents Submitted for 28-day ballot to G-12 Committee

Overview of Ballot Results

Update : 2017 May

AIR6170A Ice Melting : Summary of Ballots

Ballot Type	From	To	Result
28-day Ballot G-12 RDF Committee	October 3rd 2016	October 30th 2016	21/39 Technical/Informational Comments addressed Approved
14-day Affirmation Ballot	November 29th 2016	December 13th 2016	no disapproval
28-day Ballot Aerospace Council	January 24th 2017	February 20th 2017	no disapproval
			✓ Approved

AIR6170A - Published : 2017 February 22nd ✓

AIR6172A Ice Undercutting : Summary of Ballots

Ballot Type	From	To	Approved
28-day Ballot G-12 RDF Committee	October 3rd 2016	October 30th 2016	21/39 Technical/Informational Comments addressed Approved
14-day Affirmation Ballot	December 14th 2016	December 28th 2016	no disapproval
28-day Ballot Aerospace Council	February 14th 2017	March 14th 2017	no disapproval
			✓ Approved

AIR6172A - Published : 2017 March 16th ✓

AIR6211A Ice Penetration : Summary of Ballots

Ballot Type	From	To	Approved
28-day Ballot G-12 RDF Committee	October 10th 2016	November 6th 2016	22/37 Technical/Informational Comments addressed Approved
28-day Limited Scope Ballot	November 29th 2016	December 26th 2016	21/33 Technical/Informational Comments addressed Approved
14-day Affirmation Ballot	February 11th 2017	February 24th 2017	no disapproval
28-day Ballot Aerospace Council	April 8th 2017	May 5th 2017	no disapproval
			✓ Approved

AIR6211A - Published : 2017 May 9th ✓

Way Forward for the Next Revision of AIR Documents

Test Method	Approved 2017	Recived a suggestion to convert AIR to AS documents ?
AIR6170A Ice Melting	✔	<u>Comment received during the last ballots:</u> This document is a clearly defined test and does not fit the definition of a AIR document. At the next revision or re-affirmation, consideration should be made to convert this test to a AS document.
AIR6172A Ice Undercutting	✔	
AIR6211A Ice Penetration	✔	

Way Forward for the Next Revision of AIR Documents (Cont.)

Based on this suggestion to convert AIR to AS :

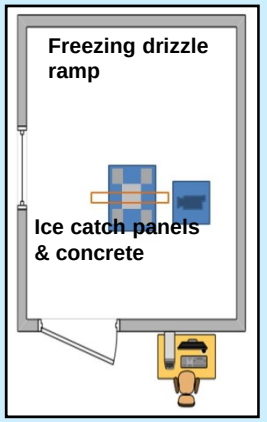
- **First Step**
  - ***Understand the difference between AIR and AS documents***
  - ***Evaluate impact and potential benefits to convert AIR to AS documents***
  - ***Look at different options***
- **Present Options to G-12 Committee**
  - ***To discuss the way forward***
  - ***Make a recommendation***
    - ✓ ***Next Montréal meeting 2017 ?***

Comparative Anti-Icing Performance Test Development - Summary

Led by : Caroline Laforte & Jean-Denis Brassard

No new data available since the Savannah Meeting

- ❑ **Still commissioning the new AMIL Cold Chamber**
  - ✓ **-5.0 °C to -40.0 °C (± 0.2 °C)**
- ❑ **Improved icing rate reproducibility**
  - ✓ **Light freezing drizzle (MDV = 115 µm)**
  - ✓ **Icing Intensity : 8.5 ± 1.0 g/dm^2.h (S.D. = ± 12%)**



Work in progress (Way forward)

- ❑ **Selection of a standardized concrete substrate**
  - ✓ **Cheap, disposable & easily available**
- ❑ **Upgrading the IR camera**
  - ✓ **Precision & workability**
- ❑ **Validation of the methodology: New paper published in Journal of Cold Regions Science & Technology**

View Doc.

The Future of the Runway Deicer Performance Working Group

- **Given that:**
  - **WG was established in 2008 in Warsaw (9 years)**
  - **Main tasks have been accomplished :**
    - ✓ **Three (3) new AIR documents developped**
    - ✓ **AIR documents improved and revised (Revision A)**
    - ✓ **Presented a test plan to develop a comparative Anti-Icing Performance Test Method (+ a scientific paper)**
- **Can we propose different options for the next :**
  - **<u>Option #1</u> : to close WG activities ?**
  - **<u>Option #2</u> : to change the mandate ? (not our choice)**
  - **<u>Option #3</u> : option # 1 + start a new working group ?**
    - **Comparative anti-Icing performance test development for Runway de/anti-icing Chemicals**
  - **Other options ?**

RDP Working Group Recommendations TBD?

Convert AIR to AS Documents

Evaluate the impact and the potential benefits

Rcommmendation could be made at the next meeting in Montréal ?

The Future of the Runway Deicer Performance Working Group ?

Option # 1: Close the WG Activities
Option # 2: Change the mandate
Option # 3: Close RDPWG, start a New WG

Special Thanks !!

- Martin Westermaier, MW Aviation Consulting, Co-Chair
- Kelvin Williamson, LNT Solutions, Co-Chair
- RDP WG Members
- AMIL Team

  + Caroline Laforte, Diane Paradis, Jean-Denis Brassard

Manufacturers / Organizations

ABAX Industries
ADDCON EUROPE GmbH
ACE/ENV Aviation Civile France
Batelle
CAAC China
CETE France
Clariant Produkte GmbH
Cryotech
Esseco UK Ltd
FAA
Kemira
Kilfrost Ltd
LNT Solutions
Nachurs Alpine Solutions
Newave Aerochemical
New Deal Deicing
Omex
Old World Industries
Proviron Industries NV
Swedavia
Transport Canada

AIR6170A / AIR6172A / AIR6211A Documents

Questions / Suggestions

Marc Mario Tremblay AMIL

Document Sponsor

of

AIR6170A, AIR6172A & AIR6211A

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Comparative evaluation of the anti-icing protection time of runway deicers using infrared thermography

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Anti-icing performance

ABSTRACT

This study presents a new method, based on infrared (IR) thermography, to evaluate and compare the anti-icing performance, i.e., the ability to delay the reformation of ice, of runways and taxiways deicing/anti-icing fluids (RDF) under icing precipitation. In summary, the test consists of applying on a standardized concrete pavement sample, a given quantity of a candidate de-icing fluid. Following the application, the concrete sample is submitted to low intensity freezing drizzle simulated in a cold chamber. Thermography picture is taken every 30 s intervals until the concrete becomes completely iced. The measurement of anti-icing performance of different concentrations of propylene glycol (PG) and potassium-formate (KFOR) solutions are shown when assessed using the new IR method at −5 °C, −8 °C and −11 °C.

AIR Documents convert to AS Standards

Current Documents	Based on the suggestion : 4 potential options
AIR6170A Ice Melting	***Option # 1:*** ***Keep Status Quo*** ❑ *Keep AIR Documents as they are* ***Option # 2:*** ***Three (3) individual AS Documents*** ❑ *Ice Melting AS6170* ❑ *Ice Undercutting AS6172* ❑ *Ice Penetration AS6211* ***Option # 3:*** ***One (1) AS Document*** ❑ *RWY performances, including :* *AIR6170A + AIR6172A + AIR6211A* ***Option # 4:*** ***One (1) AIR Document*** ❑ *RWY performances, including :* *AIR6170A + AIR6172A + AIR6211A*
AIR6172A Ice Undercutting	
AIR6211A Ice Penetration	

Sections of AIR Documents

Those sections are the same in AIR Documents (Combined AIR Documents?)

- Minimum Requirements
- Hazardous Materials
- Standard Units
- Applicable Documents
- SAE Publications
- ASTM Publications
- ISO Publications
- Material
- Standard Measuring Devices
- Reference Control Solution
- Temperature Regulated Test Enclosures
- Etc …

Option #3

AIR Documents: Summary of Ballots

AIR	From	To	Type of Ballot	Status
AIR6170A Ice Melting	October 3rd 2016	February 20th 2017	28-day Ballot Committee	✓ Approved Published 2017 February 22nd
			14-day Affirmation Ballot Committee	
			28-day Ballot Aerospace Council	
AIR6172A Ice Undercutting	October 3rd 2016	March 14th 2017	28-day Ballot Committee	✓ Approved Published 2017 March 16th
			14-day Affirmation Ballot Committee	
			28-day Ballot Aerospace Council	
AIR6211A Ice Penetration	October 10th 2016	May 5th 2017	28-day Ballot Committee	✓ Approved Published 2017 May 9th
			28-day Ballot Limited Scope Ballot Committee	
			14-day Affirmation Ballot Committee	
			28-day Ballot Aerospace Council	